IN THE CLAIMS

A presentation of all of the pending claims with their current status indicated follows.

1. (Currently Amended) A method for measuring the flow velocity of a fluid flowing through a conduit, the method comprising:

providing an array of at least two ultrasonic sensors disposed at locations spaced along the length of the conduit in the direction of the flow of the fluid, each ultrasonic sensor having an ultrasonic transmitter and an ultrasonic receiver and providing a respective sensor signal indicative of a parameter of an ultrasonic signal propagating through the fluid;

processing the sensor signals by a spatial-temporal transformation to define a convective ridge from the x-t domain to [[~~in~~]] the k-ω [[~~plane~~]] domain, the convective ridge representing a concentration of disturbances that convect with the flow; and

determining the slope of at least a portion of the convective ridge to determine the flow velocity of the fluid.

2-10. (Canceled)

11. (Currently Amended) An apparatus for measuring the flow velocity of a fluid flowing through a conduit, the apparatus comprising:

an array of at least two ultrasonic sensors disposed at locations spaced along the length of the conduit in the direction of the flow of the fluid, each ultrasonic sensor having an ultrasonic transmitter and an ultrasonic receiver and providing a respective sensor signal indicative of a parameter of an ultrasonic signal propagating through the fluid; and

a processor that performs a spatial-temporal transformation to define [[~~defines~~]] a convective ridge from the x-t domain to [[~~in~~]] the k-ω [[~~plane~~]] domain in response to the sensor signals, and determines the slope of at least a portion of the convective ridge representing a concentration of disturbances that convect with the flow to determine the flow velocity of the fluid.

12. (Currently Amended) The apparatus of claim 11, wherein the processor samples the sensor signals over a predetermined time period, accumulates the sampled sensor signals over a predetermined sampling period, and processes the sampled sensor signals to define the convective ridge in the k-ω [[~~plane~~]] domain.

13. (Currently Amended) The apparatus of claim 11, wherein the processor further determines the orientation of the convective ridge in the k-ω [[~~plane~~]] domain.

14. (Previously Presented) The apparatus of claim 11, wherein the sensor signals are indicative of vortical disturbances with the fluid.

15. (Currently Amended) The apparatus of claim 11, wherein the processor uses a beam forming algorithm to define the convective ridge in the k-ω [[~~plane~~]] domain.

16. (Previously Presented) The apparatus of claim 15, wherein the beam forming algorithm includes one of a Capon algorithm and a MUSIC algorithm.

17. (Original) The apparatus of claim 11, wherein the processor determines the slope of at least a portion of the convective ridge by approximating the convective ridge as a straight line.

18. (Previously Presented) The apparatus of claim 11, wherein the ultrasonic transmitter and the ultrasonic receiver of each ultrasonic sensor are disposed such that the ultrasonic signal therebetween is orthogonal to the direction of the fluid flow.

19. (Previously Presented) The apparatus of claim 11, wherein the processor further determines the volumetric flow rate of the fluid.

20. (Previously Presented) The apparatus of claim 11, wherein the parameter of the sensor signals is the transit time to propagate through the fluid.

21. (Currently Amended) An apparatus for measuring the flow velocity of a fluid flowing through a conduit, the apparatus comprising:

an array of at least two ultrasonic sensors disposed at locations spaced along the length of the conduit in the direction of the flow of the fluid, each ultrasonic sensor having an ultrasonic transmitter and an ultrasonic receiver and providing a respective sensor signal indicative of a parameter of an ultrasonic signal propagating through the fluid;

means for processing the sensor signals by a spatial-temporal transformation to define a convective ridge from the x-t domain to [[~~in~~]] the k-ω [[~~plane~~]] domain, the convective ridge representing a concentration of disturbances that convect with the flow; and

means for determining the slope of at least a portion of the convective ridge to determine the flow velocity of the fluid.

22. – 26. (Canceled)

27. (Previously Presented) The apparatus of claim 11, wherein the ultrasonic sensors are disposed in pitch-catch configuration wherein the transmitter and receiver are mounted opposing each other or mounted adjacent each other.

28. (Previously Presented) The apparatus of claim 11, wherein the ultrasonic sensors are disposed in a pulse-echo configuration.

29. (Previously Presented) The apparatus of claim 11, wherein the at least two ultrasonic sensors comprise an array of ultrasonic sensors comprising at least 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, or 16 ultrasonic sensors.

30. (Previously Presented) The apparatus of claim 11, wherein the parameter of the sensor signals is the amplitude of the sensor signals.

31. (Previously Presented) The apparatus of claim 11, wherein the ultrasonic sensors are clamped onto an outer surface of the conduit.

32. (Previously Presented) The apparatus of claim 11, wherein the ultrasonic sensors are attached to the conduit.

33. (Previously Presented) The apparatus of claim 32, wherein the ultrasonic sensor are in contact with the fluid.

34. (Previously Presented) The apparatus of claim 11, wherein the fluid is a single phase fluid.

35. (Previously Presented) The apparatus of claim 11, wherein the fluid is a multiphase mixture.

36. (Previously Presented) The apparatus of claim 35, wherein the multiphase mixture includes liquid and gas; or liquid and solids; or gas and solids; or gas, liquid and solids.

37. (Canceled).

38. (Previously Presented) The apparatus of claim 11, wherein the ultrasonic transmitter and the ultrasonic receiver of each ultrasonic sensor are disposed opposing each other such that the ultrasonic signal propagates through the fluid substantially orthogonal to the direction of the fluid flow.

39. (Previously Presented) The apparatus of claim 11, wherein each ultrasonic sensor includes an ultrasonic unit having both an ultrasonic transmitter and an ultrasonic receiver.

40. (Previously Presented) The apparatus of claim 39, wherein the transmitter of each ultrasonic unit transmits an ultrasonic signal that propagates through the fluid substantially orthogonal to the direction of the fluid flow, which reflects back substantially orthogonal to the direction of the fluid flow to the receiver of each ultrasonic unit.

41. (Canceled).

42. (Previously Presented) The apparatus of claim 11, wherein the processor uses an array processing algorithm.

43. (Currently Amended) An apparatus for measuring the flow velocity of a fluid flowing through a conduit, the apparatus comprising:

an array of at least two ultrasonic sensors disposed longitudinally at respective locations spaced along the length of the conduit in the direction of the flow of the fluid, each ultrasonic sensor having an ultrasonic transmitter and an ultrasonic receiver and providing a respective sensor signal indicative of a parameter of an ultrasonic signal propagating through the fluid substantially orthogonal to the direction of the fluid flow; and

a processor, in response to the sensor signals, performing a spatial-temporal transformation to define a convective ridge from an x-t domain to a k-w domain, the convective ridge representing a concentration of disturbances that convect with the flow, ~~that determines~~ to determine the flow velocity of the fluid;

wherein the processor uses an array processing algorithm to determine the flow velocity of the fluid.

44. (Canceled).

45. (Previously Presented) The apparatus of claim 11, wherein the at least two ultrasonic sensors comprise an array of ultrasonic sensors comprising three ultrasonic sensors.

46. (Previously Presented) The apparatus of claim 43, wherein the at least two ultrasonic sensors comprise an array of ultrasonic sensors comprising three ultrasonic sensors.